margin of canals, and on the sandy sea-beach. The sandy estuary of Haugchan yields little else; some of the trees at this place are known to be several hundred years old, and though prostrated, still send forth branches and bear fruit. Some are made to fall over rivulets, forming convenient bridges. They are seldom planted where anything else can be conveniently cultivated—in detached places, in corners about houses, roads, canals, and fields. Grafting is performed at the close of March, or early in April, when the trees are about three inches in diameter, and also when they attain their growth. The 'Fragrant Herbal' recommends for trial the practice of an old gardener, who, instead of grafting, preferred breaking the small branches and twigs, taking care not to tear or wound the bark.

In mid-winter, when the nuts are ripe, they are cut off with their twigs, by a sharp crescentic knife, attached to the extremity of a long pole, which is held in the hands, and pushed upwards against the twigs, removing at the same time such as are fruitless. The capsules are gently pounded in a mortar to loosen the seeds from their shells, from which they are separated by sifting. To facilitate the separation of the white sebaceous matter enveloping the seeds, they are strained in tubs, having convex, open wicker bottoms placed over caldrons of boiling water. When thoroughly heated they are reduced to a mash in the mortar, and thence transferred to bamboo sieves, kept at an uniform temperature over hot ashes. A single operation does not suffice to deprive them of all their tallow, and the steaming and sifting is therefore repeated. The article thus procured becomes a solid mass on falling through the sieve, and to purify it, it is melted and formed into cakes for the press. These receive their form from bamboo hoops a foot in diameter and three inches deep, which are laid on the ground over a little straw. On being filled with the hot liquid the ends of the straw beneath are drawn up and spread over the top, and when of sufficient consistence are placed with their rings in the press. This apparatus, which is of the rudest description, and constructed of two large beams placed horizontally so as to form a trough, is capable of containing about fifty of the rings with their sebaceous cakes; at one end it is closed, and at the other adapted for receiving wedges, which are successively driven into it by ponderous sledge-hammers, wielded by athletic men. The tallow oozes in a melted state into a receptacle below where it cools; it is again melted and poured into tubs, smeared with mud to prevent its adhering. It is now marketable, in masses about 80 pounds each —hard, brittle, white, opake, without taste, and without the odour of animal tallow; under high pressure it scarcely stains bibulous paper; it melts at 104° Fahrenheit. It may be regarded as nearly pure stearine; the slight difference is doubtless owing to the admixture of oil expressed from the seed in the process just described. The seeds yield about eight per cent. of this vegetable stearine, which sells for about five cents per pound.

The process for pressing the oil, which is carried on at the same time, remains to be noticed: it is contained in the *kernel* of the nut, the sebaceous matter which lies *between* the *shell* and *husk* having

been separated in the manner described. The kernel and the husk covering it are ground between two stones, which are heated to prevent clogging from the sebaceous matter still adhering. The mass is then placed in a winnowing machine, precisely like those in common use in other countries. The chaff being separated exposes the white oleaginous kernels, which after being steamed are placed in a mill to be mashed. This machine is formed of a circular stone groove, twelve feet in diameter, three inches deep and about as many wide, into which a thick solid stone wheel, eight feet in diameter, tapering at the edge, is made to revolve perpendicularly by an ox harnessed to the outer end of its axle, the inner turning on a pivot in the centre of the machine. Under this ponderous weight the seeds are reduced to a mealy state; they are then steamed in the tubs, formed into cakes, and pressed by wedges in the manner above described, the process of mashing, steaming, and pressing being repeated with the kernels likewise. The kernels yield above thirty per cent. of oil, and it sells for a little more than three cents per pound. It is called *Tsing-yu*, and answers well for lamps, though inferior for this purpose to some other vegetable oils in use. It is also employed for various purposes in the arts, and has a place in the Chinese Pharmacopœia, because of its quality of changing gray hair black, and other imaginary virtues. The husk which envelopes the kernels, and the shell which incloses them with their sebaceous covering, are used to feed the furnaces, scarcely any other fuel being needed for this purpose. The residuary tallow cakes are also employed for fuel, as a small quantity of it remains ignited a whole day. It is in great demand for chafing dishes in the cold weather. And finally, the cakes which remain after the oil has been pressed out are much valued as a manure, particularly for tobacco fields, the soil of which is rapidly impoverished by the Virginia weed. Artificial illumination is generally procured in China by vegetable oils, but candles are also employed by those who can afford it, and for lanterns. In religious ceremonies no other material is used. As no one ventures out after dark without a lantern, and as the gods cannot be acceptably worshiped without candles, the quantity consumed is very great. With an unimportant exception, the candles are also made of what I beg to designate as *vegetable stearine*. When the candles, which are made by dipping, are of the required diameter, they receive a final dip into a mixture of the same material and *insect-wax*, by which their consistency is preserved in the hottest weather. They are generally coloured red, which is done by throwing a minute quantity of alkanet root (*Anchusa tinctoria*), brought from Shangtung, into the mixture, which forms the coating of the candle: verdigris is sometimes employed to dye them green. The wicks are made of rush, coiled round a stem of coarse grass, the lower part of which is slit to receive the *pin* of the candlestick, which is more economical than if put into a socket. Tested in the mode recommended by Count Rumford, these candles compare favourably with those made from spermaceti, but not when the clumsy wick of the Chinese is used. They cost about eight cents per pound.

Prior to the thirteenth century, bees'-wax was employed as a coating for candles; but about that period the white *insect-wax* was discovered, since which time that article has been wholly superseded by the more costly but incomparably superior product of this insect. It has been described by the Abbé Grassier, Sir George Staunton, and others; but these accounts differ so widely among themselves, as well as from that given by native authors, as to render further inquiry desirable.

From the description given by Grassier, entomologists have supposed the insect which yields the *Pe-la*, or white wax, to be a species of *Coccus*. Staunton, on the contrary, describes it as a species of *Cicada* (*Flata limbata*). As described by Chinese writers, however, it is evidently an *apterous* insect; hence the inference, either that there are two distinct species that produce white wax, or that the insect Staunton saw was falsely represented as the elaborator of this beautiful material. This, like many other interesting questions in the natural history of this portion of the globe, must remain unsolved, until restrictions on foreign intercourse are greatly relaxed, or wholly removed. In the mean time, native writers may be consulted with advantage; and from the chief of these, the Pun-tsau and Kiunfangpú, two herbals of high authority, the subjoined account has been principally derived. The animal feeds on an evergreen shrub or tree, *Ligustrum lucidum*, which is found throughout central China from the Pacific to Thibet, but the insect chiefly abounds in the province of Sy'Chuen. It is met with also in Yunnan, Hunan, and Hupeh. A small quantity of a superior description is produced in Kinhwa, Chehkiang province. Much attention is paid to the cultivation of this tree; extensive districts of country are covered with it, and it forms an important branch of agricultural industry. In planting, they are arranged like the mulberry in rows about twelve feet apart, and both seeds and cuttings are employed. If the former, they are soaked in water in which unhusked rice has been washed, and their shells pounded off: when propagated by cuttings, branches an inch in diameter are recommended as of the most suitable size. The ground is ploughed semi-annually, and kept perfectly free from weeds. In the third or fourth year they are stocked with the insect. After the wax or insect has been gathered from the young trees, they are cut down, just below the lower branches, about four feet from the ground, and well manured. The branches which sprout the following season are trimmed, and made to grow in nearly a perpendicular direction. The process of cutting the trunk within a short distance of the ground is repeated every four or five years, and as a general rule, they are not stocked until the second year after this operation. Sometimes the husbandman finds a tree which the insects themselves have attained, but the usual practice is to stock them with the nests of the insect, which is effected in spring. These nests are about the size of a "fowl's head," and are removed by cutting off a portion of the branch to which they are attached, leaving an inch each side of the nest. The sticks, with the adhering nests, are soaked in unhusked rice-water for a quarter of an hour, when they may be separated. When the weather is damp or cool, they may be preserved in

jars for a week; but if warm, they are to be tied to the branches of the trees, to be stocked without delay, being first folded between leaves. By some, the nests are probed out of their seat in the bark of the tree without removing the branches. At this period they are particularly exposed to the attacks of birds, and require watching. In a few days after being tied to the tree, the nests swell, and innumerable white insects, the size of "*nits*," emerge, and spread themselves on the branches of the tree; but soon with one accord they descend towards the ground, where, if they find any grass, they take up their quarters. To prevent this, the ground beneath is kept quite bare, care being taken also that their implacable enemies, the ants, have no access to the tree.

Finding no congenial resting-place below, they re-ascend and fix themselves to the lower surface of the leaves, where they remain several days, whence they repair to the branches, perforating the bark to feed on the fluid within. From nits they attain the size and appearance of "*pediculus hominis*." Having compared it to this, the most familiar to them of all insects, our authors deem further description superfluous. Early in June they give to the trees the appearance of being covered with hoar frost, being *changed into wax*; soon after this they are scraped off, being previously sprinkled with water. If the gathering be deferred till August, they adhere too firmly to be easily removed. Those which are suffered to remain to stock trees the ensuing season, secrete a purplish envelope about the month of August, which at first is no larger than a grain of rice; but as incubation proceeds, it expands, and becomes as large as a fowl's head, which is in spring, when the nests are transferred to other trees, one or more to each, according to their size and vigour, in the manner already described.

On being scraped from the trees, the crude material is freed from its impurities, probably the integuments of the insect, by spreading it on a strainer covering a cylindrical vessel which is placed in a caldron of boiling water; the wax is received into the former vessel, and on congealing is ready for the market. The Pe-la or white wax in its chemical properties is analogous to purified bees'-wax, and also spermaceti, but differs from both, being in my opinion an article perfectly *sui generis*. It is purely white, transparent, shining, not unctuous to the touch, inodorous, insipid, crumbles into a dry inadhesive powder between the teeth, with a fibrous texture, resembling fibrous calc-spar; it melts at 100° Fahr., is insoluble in water, dissolves in heated essential oils, and is scarcely affected by boiling alcohol, the acids, or alkalies.

The aid of analytical chemistry is needed for the proper elucidation of this most beautiful material. There can be no doubt it would prove altogether superior in the arts to purified bees'-wax. On extraordinary occasions the Chinese employ it for candles and tapers. It has been supposed to be identical with the white lac of Madras; but as the Indian article has been found useless in the manufacture of candles*, it cannot be the same; it far excels also the vegetable wax (*Myrica cerifera*) of the United States.

* Dr. Pearson's Philosophical Transactions, vol. xxi.

Is this substance a secretion? There are Chinese who regard it as such, some representing it to be the saliva and others the excrement of the insect. European writers take nearly the same view, but the best authorities expressly say that this opinion is incorrect, and that the animal is changed into wax. I am inclined to believe that the insect undergoes what may be styled a ceraceous degeneration, its whole body being permeated by the peculiar produce in the same manner as the *Coccus cacti* is by *carmine*.

Its cost at Ningpo varies from 22 to 33 cents per pound.

The annual produce of this humble creature in China cannot be far from 400,000 pounds, worth more than £100,000.—*Silliman's American Journal*, July 1851.

Ningpo, August 1850.

NYMPHÆA ALBA VAR. MAJOR.

Botanic Gardens, Regent's Park, July 21, 1852.

Dear Sir,—A white Water Lily, found growing somewhere not far from London, has been brought to me as a new species. I have doubts about its being any more than a large variety of the *Nymphæa alba*, but I inclose you a description of it, which, if you think it worth while to draw the attention of botanists towards it at this season, you will oblige me by inserting in the 'Annals and Mag. of Nat. Hist.'

It was brought to me quite fresh by Mr. Rich. About a month ago the flowers were imperfect and small, some having five sepals to the calyx, and being more or less irregular; but a perfect one brought on the 17th was at least 7 inches in diameter, and Mr. Rich has had larger.

I remain, dear Sir, yours truly,

Wm. Francis, Esq. J. De C. Sowerby.

Nymphæa alba var.? *major*.

Flower large, all its parts more elongated than in the ordinary form of *N. alba*. The disk of the stigma very concave; the appendages of the radii cylindrical, three times as long as wide. Petaloid stamens broad-lanceolate, attenuated towards the apex, much longer than the next row of stamens. Anther-cells diverging at the base. Petals numerous, rather pointed, the innermost longer than the stamens. Sepals of the calyx ovate-elongated. Leaf broad ovate, narrowed towards the point. Ribs or primary veins ten on each side of the central one; on the back of the leaf they are narrow, raised and rigid; the secondary veins also are *raised* and firm. In other points it agrees with the ordinary *N. alba*: they both grow in the same piece of water.

In the common *N. alba* the disk of the stigma is nearly flat; the appendages to its radii are ovate, only one and a half times as long as wide. The petaloid stamens are ovate-lanceolate, the same length as the next stamens, with the anther-cells parallel. The inner petals are shorter than the stamens, ovate and obtuse. The sepals oval,

pointed. The leaves broad oval, not narrowed towards the emarginate apex; the primary veins nine on each side the central one; on the back of the leaf convex, soft; secondary veins *concave* on both sides.—J. De C. S.

ON THE STRUCTURE OF THE BELEMNITE.

To the Editors of the Annals of Natural History.

Gentlemen,—When a disputant affirms a statement 'most emphatically,' it may be suspected that the emphasis is added to supply the want of inherent truth. This is the case with Dr. Mantell when he so affirms that the "phragmocone is common to numerous genera of Cephalopods,"—a statement which is made to appear true only by attaching to the term 'phragmocone' a meaning peculiar to the asserter. A 'conical chambered siphunculated shell' is no doubt common to numerous genera of Cephalopods: before Owen's anatomy of the *Nautilus, Belemnites,* and *Spirula,* it was deemed to characterize all that section of the class which Cuvier grouped together under the wide Linnæan term of *Nautilus,* and with which the "*Siphonifera*" of Férussac and D'Orbigny is synonymous. The term 'phragmocone' was first proposed by Professor Owen, and applied by him to a particular modification of the 'conical chambered siphunculated shell'; to that viz. in which the cone is short and straight, the chambers very shallow, and rapidly enlarging, uniformly concave towards the outlet, with the siphuncle marginal and ventral, and the whole invested by a partly horny, partly calcareous layer continuous with the sheath protecting the more advanced parts of the Belemnite (Phil. Trans. 1844, pp. 68, 69). This modification of the 'conical chambered siphunculated shell' is common to all the subgenera into which the '*Belemnites*' of Cuvier have since been divided, and it is 'peculiar' to them.

The most variable and therefore least important part of their complex shell is the 'dart,' 'guard,' or 'osselet'; its different forms and proportions afford, indeed, the characters of most of the species, and in the *Bel. brevissima,* Duv., *e. g.*, it is reduced to the size of the similarly solid calcareous terminal mucro of the shell of *Beloptera, Sepia,* &c., to which, according to Cuvier, Buckland, and other eminent naturalists, it is answerable. So much, therefore, for Dr. Mantell's other affirmation that the part which he chooses to call 'osselet' is the essential part or character of the Belemnite. I shall not trespass on your space by any notice of Dr. Mantell's views of the value of Professor Owen's researches on the extinct Cephalopods possessing the 'phragmacone,' or of my own opinion of the influence of the Professor's works in general on the progress of Comparative Anatomy: and I limit myself to a single sample of the nature of the discoveries to which Dr. Mantell vaunts his peculiar claims. The part, *e. g.*, which he calls the capsule or sheath is the part so called by Buckland, together with other parts subsequently pointed out by Owen. The author of the 6th Bridgewater Treatise (p. 372) describes—"A conical thin horny *sheath,* or cup, commencing from the base of

the hollow cone of the fibro-calcareous sheath, and enlarging rapidly as it extends outwards to a considerable distance. This horny cup formed the anterior chamber of the Belemnite, and contained the ink-bag and some of the viscera." Owen subsequently traced a similarly organized membrane continued backwards from the margin of the alveolus, where Buckland's 'capsule' commences, "to line the alveolar cavity of the spathose guard," and to cover the exterior surface of the guard itself; the first description of which latter structure we find in the following words of his memoir, 'Phil. Trans.' 1844, p. 69:—"The exterior surface of the spathose guard of the *Belemnites* of the Oxford clay, though smoother than in some other species, is minutely granular, and occasionally presents faint traces of vascular impressions, proving it to have been invested by an organized membrane of the living Cephalopods." With his usual cautious exactitude he forbears to extend to this investing organized membrane the term 'capsule,' which his predecessor had correctly restricted to that part which, so far as it truly performs the function of a capsule, commences, as Dr. Buckland describes, where the fibro-calcareous sheath terminates. Every fact has its value; but this varies indefinitely, and does not become greater, when, by an abuse of terms, a small particular is laid claim to by a self-asserted discoverer.

I am, Gentlemen, your obedient servant,

THE QUARTERLY REVIEWER.

METEOROLOGICAL OBSERVATIONS FOR JUNE 1852.

Chiswick.—June 1. Clear and fine. 2. Cloudy: fine: rain. 3. Cloudy. 4. Overcast: fine: clear. 5. Very fine: slight rain. 6. Rain: clear at night. 7. Constant rain. 8. Thick whitish haze: low fog in the evening: heavy rain. 9. Excessively heavy rain throughout. 10. Rain: cloudy: clear. 11. Overcast. 12. Slight rain: overcast. 13. Fine: rain at night. 14. Showery. 15. Fine: showery: clear. 16. Rain: uniformly overcast. 17. Cloudy throughout. 18. Rain: showery: heavy rain. 19. Heavy clouds: clear and fine. 20. Overcast: rain. 21. Rain: cloudy. 22—24. Fine. 25. Uniformly overcast: fine: rain at night. 26. Rain: heavy showers. 27. Overcast: heavy showers. 28. Fine: densely overcast. 29. Overcast: cloudy: clear. 30. Fine: rather windy: clear at night.—More rain fell on the 7th, 8th, and 9th, than on any three consecutive days for at least twenty-six years near London.

Mean temperature of the month	58°·01
Mean temperature of June 1851	59 ·21
Mean temperature of June for the last twenty-six years	60 ·61
Average amount of rain in June	1·77 inch.

Boston.—June 1. Fine. 2. Fine: rain P.M. 3. Cloudy: rain A.M. 4. Fine rain A.M. 5. Fine. 6. Rain: rain A.M. 7, 8. Cloudy. 9. Cloudy: rain A.M: 10, 11. Cloudy: rain A.M. and P.M. 12. Cloudy: rain A.M. 13. Cloudy: rain P.M. 14, 15. Cloudy: rain A.M. and P.M. 16. Rain: rain A.M. and P.M. 17. Fine. rain A.M. and P.M. 18, 19. Cloudy: rain A.M. 20. Cloudy: rain P.M. 21. Rain: rain A.M. 22. Cloudy: rain A.M. and P.M. 23—25. Fine. 26. Cloudy: rain A.M.: 27. Cloudy. 28. Cloudy: rain P.M. 29, 30. Cloudy.

Sandwick Manse, Orkney.—June 1, 2. Showers. 3. Rain: showers. 4, 5. Bright: clear: fine. 6. Hazy. 7. Hazy: clear: fine. 8. Bright: fine. 9. Cloudy: damp. 10. Drizzle. 11. Drizzle: showers. 12. Damp: bright. 13. Clear: fine: cloudy. 14. Showers: cloudy: fine. 15. Bright: fine: clear: fine. 16. Bright: fine: cloudy. 17. Clear: fine: cloudy. 18. Damp: fog. 19. Bright: clear: fine. 20. Damp. 21. Damp: fog. 22, 23. Rain. 24, 25. Bright: showers. 26. Bright: rain. 27. Bright: showers: fine. 28. Clear: fine: drops: fine. 29. Clear: fine: cloudy: fine. 30. Rain.

Meteorological Observations made by Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

Days of Month.	Barometer.					Thermometer.					Wind.			Rain.		
	Chiswick.		Boston. 8¾ a.m.	Orkney, Sandwick.		Chiswick.		Boston. 8¾ a.m.	Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Orkney, Sandwick.	Chiswick.	Boston.	Orkney, Sandwick.
1852. June.	Max.	Min.		9¼ a.m.	8½ p.m.	Max.	Min.		9¼ a.m.	8½ p.m.						
1.	29·889	29·849	29·40	29·64	29·65	66	48	52·5	47	46	w.	w.	e.	·07	.....	·16
○ 2.	29·866	29·791	29·35	29·63	29·63	63	50	60	57	48½	sw.	s.	e.	·09	.....	·18
3.	29·838	29·709	29·16	29·54	29·46	65	41	62	51	49½	sw.	ssw.	se.	·03	·40	·48
4.	29·901	29·716	29·26	29·66	29·78	70	43	57·5	54	54	sw.	ssw.	se.	·02	·01	·12
5.	29·970	29·873	29·46	29·87	29·96	69	54	57·5	56	57	s.	e.	se.	·03	.....	.....
6.	29·839	29·678	29·27	29·96	29·94	71	52	61·5	56	51	sw.	se.	ese.	·03	·32	.....
7.	29·579	29·539	29·13	29·96	30·01	62	51	67	55½	55	se.	e.	ese.	·41	.....	.....
8.	29·617	29·580	29·13	30·01	29·98	69	51	66	60	55½	sw.	calm	e.	·45	.....	.....
☾ 9.	29·570	29·518	29·10	29·91	29·77	61	51	59	54	50	sw.	n.	n.	1·48	·12	.....
10.	29·548	29·539	29·05	29·64	29·57	59	42	51	50	49½	nw.	n.	n.	·18	·15	·04
11.	29·598	29·490	28·96	29·54	29·59	57	40	49·5	53½	51	w.	wnw.	nnw.	·01	·35	.....
12.	29·738	29·589	29·17	29·64	29·63	61	42	47·5	53	50	nw.	n.	w.	·02	·13	.....
13.	29·719	29·476	29·20	29·52	29·40	65	48	46·5	53½	52	w.	wnw.	ese.	·28	.....	.....
14.	29·374	29·214	28·73	29·33	29·42	67	46	60	54	53	w.	wnw.	e.	·13	·12	·07
15.	29·570	29·477	28·99	29·52	29·56	67	44	60	55½	53	w.	w.	ese.	·16	·35	.....
16.	29·415	29·384	28·94	29·50	29·41	68	50	57·5	58	55	sw.	se.	e.	·20	·12	.....
● 17.	29·490	29·437	29·00	29·41	29·50	67	50	60	59	55	s.	s.	ese.	·09	·07	.....
18.	29·576	29·538	29·08	29·61	29·70	66	52	63	60	56	s.	s.	e.	·30	·13	.....
19.	29·750	29·578	29·14	29·76	29·80	69	49	67	63	56	sw.	s.	e.	·12	·09	.....
20.	29·780	29·577	29·30	29·69	29·58	69	56	61	59	55	s.	s.	w.	·05	·36	.....
21.	29·622	29·541	29·12	29·48	29·46	68	46	65	63	56	sw.	ssw.	ese.	·02	·09	·07
22.	29·745	29·628	29·14	29·26	29·28	68	51	62	58½	53	sw.	ssw.	sse.	.....	·14	·09
23.	29·849	29·717	29·23	29·36	29·53	72	47	59	57	53	sw.	ssw.	sw.	.....	.....	·65
☽ 24.	30·075	29·986	29·46	29·70	29·82	76	44	63	57½	58	w.	w.	se.	·01	.....	·22
25.	30·048	29·904	29·54	29·85	29·75	74	57	61	60	55½	s.	s.	se.	·32	.....	·04
26.	29·814	29·708	29·25	29·62	29·62	71	52	63·5	61	56	sw.	ssw.	se.	·12	.....	·02
27.	29·824	29·760	29·30	29·67	29·65	71	51	66	60	56½	sw.	ssw.	ese.	·04	·17	·22
28.	29·786	29·761	29·24	29·56	29·59	68	56	63	62	56	sw.	s.	w.	·03	.....	·03
29.	29·787	29·715	29·23	29·52	29·33	67	53	67	62	59	sw.	sw.	ese.	.....	·27	.....
30.	29·937	29·844	29·20	29·28	29·41	71	47	64	58½	56½	sw.	w.	w.	.....	.....	·66
Mean.	29·737	29·637	29·18	29·621	29·622	67·23	48·80	60·0	56·95	53·71				4·69	3·39	3·05